VIRTUAL FUNCTION USING FLIPPED CLASSROOM

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ABSTRACT

As the name suggests in flipped class or inverted class the lecture and homework sessions are interchanged. The effective flipped classroom is one in which the in class time is spent more in creative thinking and peer to peer discussions.

We have utilized flipped classroom concept for Object oriented programming with C++.The Objective is to make students apply the learnt concepts to real world problems or projects so that higher level cognitive work can be achieved than lower level cognitive work where only listening an d understanding the concepts play major role.

Introduction:
In present internet trend all the data or information will be on the internet. The students can get the information on internet and through books. The teacher only doing whatever is there in the book will not makes students interesting. The students should not be restricted to only listening in the class room sessions. To make teaching effective flipped classroom concept will help. What makes flipped classroom so different from normal classroom teaching.
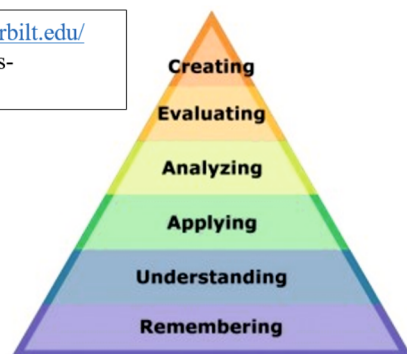
Curtesy:https://cft.vanderbilt.edu/ guides-sub-pages/blooms-taxonomy/

Figure 1.1 Blooms taxonomy

The will get the knowledge and comprehension outside the class at lower levels of cognitive work and inside the class they will apply, analysis and evaluate with the help of instructor, peer discussion at higher cognitive levels.

Critical thinking, communication, creative thinking and collaboration are the benefits of flipped classroom. Flipped classroom includes in-class and out of class segments. As part of Out of class segment the course materials will be available to the students at anytime from anywhere[1]. Students can read and understand the concepts and will be prepared to class before coming to the class. Out of class can also contains some assignments related to the topic so that the teacher can understand the level at which the student has understood the concept.

Before adapting flipped classroom activity to the course the teacher should check the feasibility of achieving. It may not be suited for all the courses.

Literature survey:
The flipped classroom concept is been used in so many domains from so many years. Author Barbara Walvood and Virginia Johnson Anderson used flipped classroom in book Effective Grading in 1998. In their model the students gain the knowledge about the topics, do assignments and come to the class. Based on the assignments the instructor knows the extent to which students know the concepts[2].

Maureen Lage, Glenn Platt, and Michael Treglia came up with inverted class room approach and reported its application in an introductory economics course in 2000.in this approach they have given the students the textbooks, PowerPoint presentations with voice and made students to have an exposure to the topics before class. The students were asked to complete the worksheets which are collected randomly and graded. The class time was spent more on the applicability

of the concepts and students were happy[3].

Eric Mazur and Catherine Crouch described peer instruction concept in 2001.In this approach the students were given the exposure on the topic and uses quizzes for assignment to make the prepared for class. All the students are asked questions and needs to answer so that the instructor will get the class data. Thenthe instructor will give the correct answer with the explanation. This discussion time can be 10-15 mins[4].

Features of flipped classroom:
1. Gain the knowledge about the topics before the class.
   The source given can be textbooks, screencast of instructors own video or already existing video.

2. Students can come prepared for class.
   The assignments,quizzes and worksheets will help students in understanding concepts better.

3. Assessing the students
   The pre-class assignments that students complete as evidence of their preparation can also help both the instructor and the student assess understanding

4. Can achieve higher level cognitive work than lower level cognitive level
   By analyzing and applying the concepts instead just listening to the lectures.

Methodology:
Two components are there in flipped classroom first one out of class segment and second in class segment.

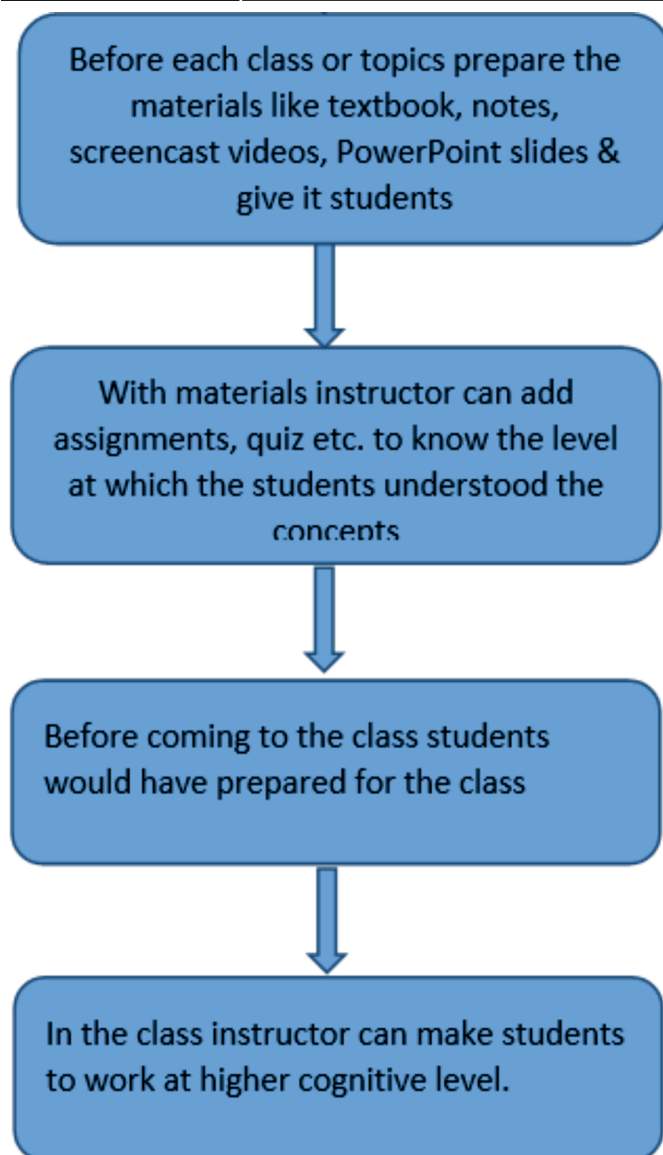**Out of class activity or segment:**
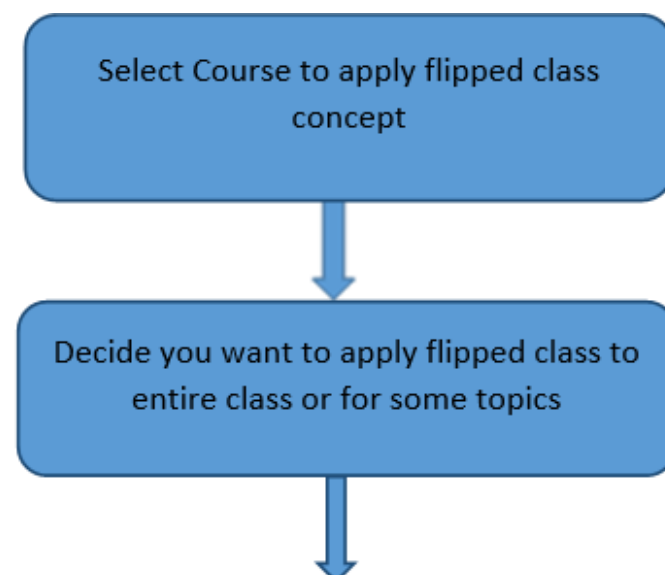
Figure 1.2. Step by step approach for creating out-of-class segment

We have created out-of-class segment for virtual functions:

Course: Object oriented programing with C++

Topic: Virtual functions

The Learning Objectives(at lower cognitive level) of out-of-class activity:

1. Understand virtual functions

2. Merits and demerits of virtual functions

3. Apply virtual functions in real world problems/projects

The Important concepts to be covered:

a. Virtual functions

b. Virtual table & virtual pointer

c. Pure virtual functions

Materials about the topic:
Here we are using Video about the topic

Note: if you want to create/want to search video about the topic the length of video should be less than 10 minutes. If the video size is very large then the students may not see the complete video. If it is more than 0mins cut it into small sizes and then give it to students.

Just by giving materials we cannot make out what students understood so we can add assignments aligned with learning objectives and evaluate.

The assignments for virtual functions aligned with learning objectives:

Learning objectives	Assignment	Duration	Instructions if any
Understanding virtual functions	Write a program to show the effect of virtual functions	4 minutes	Use base and derived class
Merits and demerits of virtual functions	List the advantages and disadvantages	3 minutes	recall
Apply virtual functions in real world problem	Write a program to calculate the area of rectangle, triangle and circle by using shape as base class and other classes derived from shape class	4 minutes	Use dynamic polymorphism with base and derived class

We have created in-class-segment for virtual functions:

The learning objectives (at higher cognitive level) for in-class activity:

1. Analyze, apply the virtual functions to real world problems

2. Analyze when to use virtual functions

The activities planned for in-class activity:

a. Think-pair-share

b. Peer instructions

Think-pair-share activity:

Think phase:
The instructor will give the problem to students and asks them to write pseudo code for the given problem and gives time. The task given should not be too complicated so that students cant think.

After the think phase each student will be ready with some psedocode,if not instructor can address them.

Pair phase:
After think phase we have pair students 2 to 3 in a group and ask them discuss and write the program and allot some time. If any students have some problems instructor can help them.

Share phase:
After pair phase each group can share their program with class and after discussion instructor can give the proper and efficient solution to the problem.

Peer instructions:
We can fellow peer instructions also. Here each student will be asked to write the program and after that can group up with peers to discuss with their implementation ideas.

After the activities the instructor can give quiz questions to answer to know how much students have understood so that the concepts can be brushed up.

Conclusion:
Flipped classroom is an efficient technique where students will learn concepts at higher cognitive level instead of lower cognitive level. In future entire course can be taught using flipped classroom. Students are actively engaged in concept learning. The students will get multiple solutions to the problems. Individual attention is given to student's in-class which will help the students.

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